

Appl. No. 10/804,890

**Amendments to the Drawings**

The attached sheet of drawings includes changes to FIGS. 2 and 3. This sheet, which includes FIGS. 1-4, replaces the original sheet including FIGS. 1-4. FIGS. 2 and 3 of the drawings were amended to correct minor informalities. More particularly, the reference to atomic mass unit "AMU" was changed from "ANU" to "AMU" in both FIGS. 2 and 3.

Attachment: Replacement Sheet  
Annotated Sheet Showing Changes

Appl. No. 10/804,890

**REMARKS/ARGUMENTS**

Thorough examination and careful review of the application by the Examiner is noted and appreciated.

Paragraph 0056, 0059, 0061-0064, and 0067 of the specification was amended to associate the units of "cm" with Re, Ram, and L.

Figures 2 and 3 were amended to correct the label from "ANU" to "AMU" referring to atomic mass unit.

The examiner has rejected claims 1-9, 11-14, 17 and 18. Claims 2, 7-8 and 10 were canceled. Claims 1, 6, 9, 11-12 and 17 have been amended. Claims 19-20 have been newly added. Claims 1, 3-6, 9 and 11-20 are pending.

The changes in the drawings, specification and claims do not introduce new matter but clarify matters shown and described in the application as filed. The foregoing amendments and following remarks are believed to be fully responsive to the Office Action mailed December 1, 2004 and render all currently pending claims at issue patentably distinct over the references cited by the Examiner. The foregoing amendments are taken in the interest of expediting prosecution and there is no intention of surrendering any range of equivalents to which Applicant would otherwise be entitled in view of the prior art. Reconsideration and examination of this application is respectfully requested in light of the foregoing amendments and the following remarks.

**EXAMINER'S OFFICE ACTION**

In the December 1, 2004 Office Action (hereinafter 12-1-04 OA) referenced above, the Examiner:

objected to the specification based on informalities present in the specification;

rejected Claims 8-11, 17 and 18 under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention;

rejected Claims 1, 2, 4-7, 12-14, 17 and 18 under 35 USC §102(a) and (e) as being anticipated by Adams et al. U.S. Patent No. 6,670,624 (hereinafter, "ADAMS");

rejected Claims 1, 2, 4-7, 12-14, 17 and 18 under 35 USC §102(b) as being anticipated by Byun et al. U.S. Patent No. 6,177,679 (hereinafter, "BYUN");

rejected Claims 3, 8, 9 and 11 under 35 USC §103(a) as being obvious over ADAMS in view of general knowledge in the art; and

rejected Claims 3, 8, 9 and 11 under 35 USC §103(a) as being obvious over BYUN in view of general knowledge in the art.

**Objections to the Specification**

The specification was objected to based on the following informalities as specified in the 12-1-05 OA:

both the offset Re-Ram and Re do not carry a proper unit.

Accordingly, paragraphs 0056, 0059, 0061-0064, and 0067 were amended to properly associate a unit of "cm" with Re, Ram, and L.

The objections to the specification have been obviated and should respectfully be withdrawn.

### **Amendments to the Drawings**

FIGS. 2 and 3 of the drawings were amended to correct minor informalities. More particularly, the reference to atomic mass unit "AMU" was changed from "ANU" to "AMU" in both FIGS. 2 and 3. Approval of the drawing changes as provided in the Appendix is respectfully requested.

### **Objections to the Claims**

Examiner objected to claims 10, 15, and 16 as being dependent upon a rejected base claim, but stated that claims 10, 15, and 16 would be allowable if rewritten in independent form including all of the limitations of the base claim and if rewritten to overcome the 35 USC 112, 2<sup>nd</sup> paragraph rejections.

More particularly, Examiner stated in the 12-1-04 OA, page 11, clause 10 that:

"Claim 10 would be allowable for limiting the amu-variation of the desired ions to less than .5 amu, which is neither anticipated nor rendered obvious by any prior art.

Claims 15 and 16 would be allowable for reciting steps that may effectively prevent undesirable ions from being implanted into the target wafer, i.e., the step of "signaling an alarm" in claim 15, and the step of "stopping the operation of the ion implanter" in claim 16."

Thus, the limitations of claim 10, and intervening claims 7 and 8, have been incorporated into independent claim 6. Accordingly, claims 7-8, and 10 have been canceled.

Additionally, the dependency of claims 9 and 11, which originally depended on claim 8, has been changed to depend on amended claim 6. The dependency of claims 12, which originally depended on claim 7, has been changed to depend on amended claim 6. The dependency of claim 12 was changed from 7 to 6.

It is believed that claim 6 and claims depending therefrom, including claims 15-16, is in condition for allowance.

Additionally, claims 19 and 20 have been newly added to incorporate the limitations of claims 15 and 16, respectively. Claim 19 defines a method of using an ion implanter, the method having the step of:

    "providing an ion implanter having:  
        an atomic mass unit analyzing magnet having a radius  $R_{am}$ ,  
    and  
        a communication interface adapted to monitor implantation parameters including an ion extraction voltage  $V_E$  of an ion source of implanting ions and a real-time magnetic flux density  $B$  of a magnetic field of the AMU analyzing magnet;  
    determining in real-time if an ion implanter is implanting a desired ion into a target wafer;  
    determining an offset between the  $R_{am}$  and a real-time estimated radius of a circular path of each of a plurality of ions having a desired AMU ( $m$ ) being implanted ( $R_e$ );  
    providing a predetermined radius tolerance level  $L$ ; and  
    determining if an absolute value of the offset between  $R_{am}$  and  $R_e$  is greater than the predetermined radius tolerance level  $L$ ; and  
    **signaling an alarm if  $|R_{am}-R_e|>L$ .**"

The step of "signaling an alarm if  $|R_{am}-R_e|>L$ " is not taught or suggested in the prior art references. Thus, it is believed that claim 19 is in condition for allowance.

Also, claim 20 was newly added to recite a method of using an ion implanter, the method having the steps of:

    "providing an ion implanter having:  
        an atomic mass unit analyzing magnet having a radius  $R_{am}$ ,  
    and  
        a communication interface adapted to monitor implantation parameters including an ion extraction voltage  $V_E$  of an ion source of implanting ions and a real-time magnetic flux density  $B$  of a magnetic field of the AMU analyzing magnet;  
    determining in real-time if an ion implanter is implanting a desired ion into a target wafer;  
    determining an offset between the  $R_{am}$  and a real-time estimated radius of a circular path of each of a plurality of ions having a desired AMU ( $m$ ) being implanted ( $R_e$ );  
    providing a predetermined radius tolerance level  $L$ ; and  
    determining if an absolute value of the offset between  $R_{am}$  and  $R_e$  is greater than the predetermined radius tolerance level  $L$ ; and

**stopping operation of the ion implanter if  $|R_{am}-R_e|>L$ ."**

The step of "stopping operation of the ion implanter if  $|R_{am}-R_e|>L$ " is not taught or suggested in the prior art references. Thus, it is believed that claim 19 is in condition for allowance.

Also, the 112 rejections of claims 8-11 are rendered moot as further discussed in the "Rejections Under 35 USC §112" section infra.

Therefore, the objections to claims 10, 15, and 16 have been obviated and should be removed. It is believed that claims 10, 15 and 16 are now in condition for allowance.

### **Rejections Under 35 USC §112**

Claims 8-11, 17 and 18 were rejected under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. More particularly, the 12-1-04 OA, page 3, clause 2 stated with regard to claims 8-11, 17 and 18 that "the wording "radius tolerance level L", which is deemed indefinite because its definition, as described in the specification, does not have a correct unit (see above objection to the specification). Since both  $R_{am}$  and  $R_e$  have a dimension of length, the offset L, defined as the absolute value of  $|R_e-R_{am}|$ , must have the dimension of length, too".

Accordingly, the definition of radius tolerance level L is now defined in the specification as having a dimension of length

Appl. No. 10/804,890

measured in centimeters. See discussion of "Objection to the Specification", supra.

Additionally, with regard to claim 11, the Examiner stated "in order to proceed with this examination, the predetermined value of  $L=0.02$  is assumed as being totally arbitrary, and can be replaced by any numerical value expressed in any unit, as long as it is a finite number."

Accordingly, amended claim 11 now defines the unit of  $L$  as being 0.02cm.

With regard to claims 8 and 10, claims 8 and 10 have been canceled, thus rendering the rejection of claims 8 and 10 moot.

In light of the amendments to the specification and claim 11, the indefinite rejections under 35 USC § 112, second paragraph has been obviated.

#### **Rejections under 35 U.S.C. §102**

Claims 1, 2, 4-7, 12-14, 17 and 18 stand rejected under 35 USC §102(a) and (e) as being anticipated by Adams et al. U.S. Patent No. 6,670,624 (hereinafter, "ADAMS"); and

Claims 1, 2, 4-7, 12-14, 17 and 18 stand rejected under 35 USC §102(b) as being anticipated by Byun et al. U.S. Patent No. 6,177,679 (hereinafter, "BYUN").

The 102 rejections of claims 1, 2, 4-7, 12-14, 17 and 18 based on ADAMS and BYUN are respectfully traversed.

Appl. No. 10/804,890

Claims 1, 6, and 17 have been amended to include the limitation of providing an ion implanter that uses

"a plurality of implantation data to ensure that an AMU of an ion being implanted has less than a .5 AMU difference from an AMU of a desired ion to be implanted, wherein the plurality of implantation data is selected from data relating to a plurality of ions each having predefined AMUs, each of the plurality of ions associated with a monitored B and a monitored  $V_g$ ".

Examiner stated in the 12-1-04 OA, page 11, clause 10 that limiting the amu-variation of the desired ions to less than .5 amu is neither anticipated nor rendered obvious by any prior art.

Thus, the limiting of the amu-variation of the desired ions to be implanted less than .5 amu is not disclosed, taught or suggested in either the ADAMS or the BYUN references.

Thus, in light of the amendment to independent claims 1, 6, and 17, the rejection of claims 1, 6, and 17 and the claims that depend therefrom are rendered moot.

With regard to claims 2 and 7, claims 2 and 7 have been canceled, thus rendering the rejection of claims 2 and 7 moot.

#### **Rejections under 35 U.S.C. §103**

Claims 3, 8, 9 and 11 stand rejected under 35 USC §103(a) as being obvious over ADAMS in view of general knowledge in the art; and

Claims 3, 8, 9 and 11 stand rejected under 35 USC §103(a) as being obvious over BYUN in view of general knowledge in the art.



Appl. No. 10/804,890

The 103 rejections of claims 3, 8, 9 and 11 based on ADAMS and BYUN in view of general knowledge in the art are respectfully traversed.

The arguments for novelty of claims 3, 8, 9 and 11, as amended, over ADAMS and BYUN do not differ from those in the above used in defense of claims 1, 6, and 17 as amended: the ADAMS and BYUN references do not disclose, teach, or suggest the limiting of the amu-variation of the desired ions to be implanted less than .5 amu. Adding general knowledge in the art does not affect those arguments since the general knowledge in the art does not disclose or teach limiting the amu-variation of the desired ions to be implanted to be less than .5 amu.

The references of record fail to provide the necessary motivation of one skilled in the art to combine the individual teachings to arrive at the Applicants' invention. The references of record fail to yield Applicants' invention.

Thus, the present invention, as set forth in the newly added claims 19-20 and the now amended claims 1, 6, and 17, the claims that depend from claims 1, 6, and 17 respectively are clearly distinct from the art of record.

Independent Claims 1, 6, and 17 were amended to clarify the features of limiting an amu variation of an ion being implanted and a desired ion to be implanted to less than .5 amu. Claim 19 was added to define the feature of signaling an alarm if a predefined tolerance level was exceeded. Claim 20 was added to define the feature of stopping an ion implanter operation if a predefined tolerance level was exceeded.

Appl. No. 10/804,890

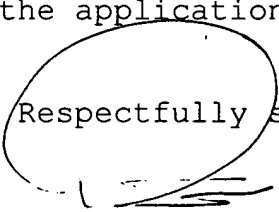
The foregoing amendments further clarified some of the features of ion implanter and method of the present invention. It is believed that the present invention as amended is novel and non-obvious over the references relied upon by the examiner.

Additionally, as discussed previously, because none of the references cited and relied upon by Examiner disclose, teach or suggest all of the features alone or in combination of the claimed invention, the 103 rejections are believed to be obviated.

Based on the above, it is respectfully submitted that the newly added claims 19-20 and amended claims 1, 6, and 17, and claims depending therefrom are in condition for allowance, which allowance is earnestly solicited.

Based on the foregoing, the Applicant respectfully submits that all of the pending claims are now in condition for allowance. Such favorable action by the Examiner at an early date is respectfully solicited. In the event that the present invention is not in a condition for allowance for any other reasons, the Examiner is respectfully invited to call the Applicant's representative at his Bloomfield Hills, Michigan office at (248) 540-4040 such that necessary action may be taken to place the application in a condition for allowance.

Respectfully submitted,



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